2.0 Project Alternatives

2.1 Transportation Strategies Considered

Several types of transportation strategies were considered in order to meet the future transportation needs of Route 54. Specifically, the following transportation strategies were considered:

- No Action
- Transportation System Management (TSM)
- Upgrade of Existing Route 54, and
- Build alternatives, partially or entirely on new alignment.

2.1.1 No Action

The No Action strategy fails to meet the objectives and to address the needs outlined in the project Purpose and Need. If No Action is taken, levels of service can be expected to degrade to failure levels (LOS F) and accidents are likely to increase. However, the No Action strategy was retained as a basis for comparison against other project alternatives.

2.1.2 Transportation System Management (TSM)

TSM actions, such as signal phasing and rerouting of traffic along the existing roadway system, were determined to be impractical due to the traffic congestion along Route 54 and the use of Route 54 as a through-traffic facility. Additionally, TSM improvements would not solve the transportation problems identified in the project Purpose and Need. The desired transportation facility needs to alleviate congestion, and TSM is not well suited for this. As a result, this strategy was not considered in detail as an ultimate solution, and was eliminated.

2.1.3 Upgrade of Existing Route 54

The upgrade of existing Route 54 strategy failed to meet the objectives and identified needs (i.e., congestion, safety, and system continuity) presented in the project Purpose and Need. Therefore, this strategy was not considered viable. In the 1990s, existing Route 54 went through a major upgrade, being widened from two to five lanes. Additional widening would likely result in relatively high right of way costs as many businesses would either be displaced or would lose parking and frontage. Additionally, upgrading Route 54 by adding additional lanes would not meet the stated route continuity objective of the Purpose and Need. Route continuity can only result from a build alternative and cannot be achieved through road widening or shoulder paving.

2.1.4 Build Alternatives Partially or Entirely on New Alignment

For this project, the build alternative transportation strategy was considered viable for further study with the intent of developing build alternatives that either minimize or avoid environmental impacts and displacements. Additionally, the build alternatives should consider traffic and engineering impacts to the existing infrastructure. For this project, a design year of 2021 was used in forecasting traffic growth. Additionally, the Purpose and Need indicates safety could be improved by reducing congestion and by improving access.

2.2 Facility Type

As mentioned in the Purpose and Need, one project purpose is to provide continuity with established and planned portions of Route 54 having similar designs. The facility type developed for both of the adjacent sections to this project is a four-lane highway with a 52-foot median (MoDOT pavement standard D-61). For this project, the intended facility type for the build alternatives should be consistent with this design (Figure 2-1).

Route 54 functions as a principal arterial. The terrain through this section is rolling with some areas of steep slope. The current traffic volumes on Route 54 in the study area are approximately 40,000 to 45,000 vehicles per day (vpd).

2.3 Development of Preliminary Constraints

Constraints considered during this process entailed those that represented environmental concerns as well as those that had implications with regard to engineering feasibility. Examples of environmental constraints considered during the location study included:

- Community/business Impacts;
- Wetlands;
- Floodplains;
- Surface water resources (streams, water bodies);
- Threatened and endangered species;
- Rare or unique ecological communities;
- Geologic resources (areas of past mining);
- Potential or known hazardous waste sites;
- 4(f) and 6(f) lands;
- Archaeological or historic sites;
- Noise Impacts;
- Churches, schools, and cemeteries; and
- Residential and commercial areas.

Similarly, constraints were also identified that had implications on engineering feasibility or on the efficiency of the transportation system. Examples of such considerations included:

- Terrain;
- Capacity of the existing roadway (i.e., LOS);
- Accident patterns;
- Access to existing development; and
- Existing infrastructure (roads, utilities, transmission lines).

Constraint information was developed by acquiring and consolidating information from a variety of sources including public involvement meetings, file information from MoDOT, other state [i.e., Missouri Department of Natural Resources (MDNR), Missouri Department of Conservation (MDC)], and federal agencies [i.e., Natural Resources Conservation Service (NRCS), U.S. Fish and Wildlife Service (USFWS), U.S. Environmental Protection Agency (USEPA), Federal Emergency Management Agency (FEMA), U.S. Geological Survey (USGS), U.S. Army Corps of Engineers (USACE)], and field reconnaissance.

The result of this analysis was the development of an alignment for the alternative that satisfactorily achieved the objectives of the project.

2.4 Criteria for the Development of Study Alternatives

2.4.1 Purpose for Developing Study Alternative Criteria

Criteria were developed in order to guide and direct the development of study alternatives. These criteria were used as a framework by which to develop study alternatives that are logical and reasonable based upon information identified in the project Purpose and Need. The criteria were largely based upon transportation and engineering information (i.e., traffic and access issues, and engineering considerations relative to topographic and geologic conditions). Additionally, the criteria took into account environmental resources (i.e., those listed in Section 2.3) so that alternative development initiated the process of avoiding and minimizing impacts. The ultimate goal of the study team was to understand the sensitivity and relative importance of various environmental resources in the corridor to allow for the development of logical and reasonable alternatives that minimized and/or avoided these resources.

The environmental resources database was developed using geographical information system (GIS) using information from USGS, National Wetland Inventory (NWI) maps, and other state-run spatial data sites through the University of Missouri.

Engineering considerations include traffic and transportation issues and ease of construction. Access to adjacent properties and high accident locations were the primary traffic elements considered. Terrain and access to adjacent land use played an integral role in determining the ease of construction.

Environmental considerations included impacts to the natural and human environment, and cultural resources. Structures eligible and potentially eligible for listing on the National Register of Historic Places (NRHP) were considered important cultural resources.

2.4.2 Criteria for Development of the Study Alternatives

The following criteria were determined to be reasonable for the development of the study alternatives.

1. **Improve Efficiency and Safety –** The study alternatives should be developed to improve traffic flow by facilitating through traffic and accommodating local traffic within the study area. The emphasis is to maximize accessibility to local traffic movements without degrading the through traffic movements or safety. Of particular interest is the area near the southern terminus, which has numerous commercial developments and relatively high traffic volumes.
2. **Minimize or Avoid Environmental Impacts While Developing Reasonable Project Alternatives –** The study alternatives should be developed to avoid and minimize impacts to the previously-listed resources (see Section 2.3):
    - Those that are protected under existing laws or regulations (i.e., threatened and endangered species);
    - Those resources that, if impacted, would result in additional documentation, permitting, mitigation, and/or agency coordination [i.e., impacts to 4(f)/6(f) properties, wetlands]; and
    - Those that would incur, via impact, relatively high costs to MoDOT and FHWA (i.e., disruption of business districts, displacement of existing infrastructure or utilities, clean-up activities of properties listed as containing hazardous materials).

2.5 Study Alternatives

A number of project alternatives were considered in order to address the current and future transportation needs in the Route 54 study area. Alternatives considered include:

- No Action Alternative
- Build Alternatives
  - Alternative A1 – Far western relocation of Route 54 between existing Route 54 and the Lake of the Ozarks (Figure 2-2);
  - Alternative A2 – Near western relocation of Route 54 between existing Route 54 and the Lake of the Ozarks (Figure 2-3);
  - Alternative B – Upgrade on existing alignment and then a western relocation of Route 54 between existing Route 54 and the Lake of the Ozarks (Figure 2-4); and
  - Alternative C – Relocation of Route 54 east of existing Route 54 then crossing existing Route 54 and relocating west of existing Route 54 (Figure 2-5).

Alternative C was retained for further analysis; however, it was modified with a slight easterly shift within the northern half of the alignment to avoid several commercial businesses adjacent to existing Route 54 (among these were Motel 6 and Staples office supply store). The study team felt that, with the shift in the alignment, this alternative had merit to be retained for further analysis. The shifted alternative was labeled Alternative C' (Figure 2-6).

2.6 Alternatives Eliminated from Further Consideration

2.6.1 Alternative B

Alternative B (upgrade on existing alignment in the northern half with a western relocation in the southern half) begins at the intersection of Business 54 and Route 54 and proceeds along the existing Route 54 alignment to near the Staples office supply store where it then veers easterly off of the existing alignment before turning southwesterly where it then crosses Route 54 just south of the Ozark Opry (Figure 2-4). From there, the alignment is nearly identical to Alternative A2.

This alternative was eliminated primarily due to the impacts to the commercial businesses along existing Route 54 at the northern extent of the alternative. Approximately 10 commercial parcels were affected by this alternative, which resulted in the displacement of as many or more businesses on those parcels (some parcels incorporate multiple uses). Included in these displacements were Staples office supply store and Motel 6. The additional displacement total results in higher right of way cost and a much more negative public perception of the project.

2.6.2 Direct Connection to the Proposed Expressway from Route 42

Early in the development of the expressway alternatives, consideration was given to a western extension of Route 42 from the intersection at Route 54 to the proposed expressway (Figure 2-7). This extension falls on new alignment with the intent of providing a direct connection from Route 42 to the new expressway while eliminating any direct access to existing Route 54 west of the McDonalds.

While a potential connection to Route 42 would carry a sufficient amount of traffic from Route 42 to the new expressway, it would fail to attract enough traffic away from existing Route 54 south of Route 42. Therefore, a Route 42 extension does not preclude improvements to existing Route 54 and access to the new expressway at Route 54. Additionally, a Route 42 extension requires the development of a continuous local road parallel to existing Route 54 to relieve

congestion south of Route 42 on Route 54. This parallel road facility would likely need to be developed through local efforts. Local officials have stated that they have no money to develop such a facility. Lastly, an extension of Route 42 does not address the existing traffic signal congestion at Route 42 and Route 54. For these reasons, a Route 42 extension was eliminated from consideration as an alternative form of access at the southern terminus of this project.

2.6.3 Single Point Interchange at Southern Terminus

Early in the development of interchange options at the southern terminus, a single-point urban diamond (SPUD) was considered at existing Route 54 approximately 850 feet west of McDonalds (Figure 2-8). A SPUD brings all of the left turn movements in the interchange to a single point. These movements are controlled by only one set of traffic signals instead of two sets of signals at a conventional diamond interchange. However, a detailed traffic analysis of this interchange type at the southern terminus revealed that the design year volumes through the interchange would exceed its capacity. In fact, levels of service would reach a failure level before the design year and would result in failed traffic progression between Route 42 and Lake Road 54-22 (Bluff Drive).

2.7 Alternatives Retained for Detailed Analysis

For each of the following alternatives, one interchange configuration is proposed at the southern terminus at Route 54. The proposal is to construct a split diamond interchange at Route 54. For this to occur, a companion one-way roadway (westbound) is proposed north of existing Route 54, with existing Route 54 becoming one-way (eastbound) in the opposite direction (Figure 2-9). Because of the close proximity to Lake of the Ozarks State Park to the south of existing Route 54, a decision was made to locate the companion roadway north of existing Route 54 between Route 42 and Bluff Drive. Approximately 450 feet separate the companion road and existing Route 54, thus creating a “split” in the diamond interchange at this location. The on and off ramps at each end of the diamond are connected by one-way collector ramps between the split. This interchange concept is referred to in this document as a “one-way couple.” Plan view layouts of this interchange concept can be found in Appendix B. As part of the one-way couple, a number of other improvements are proposed. A grade-separated ramp from Route 42 to westbound Route 54 is proposed. This is necessary to reduce the demand on the traffic signal at the Route 54/Route 42 intersection. The ramp will tie into the portion of Route 54 that is on new alignment and is one-way westbound. A two-way connection roadway between each direction of Route 54 is proposed approximately 1,000 feet west of Route 42 to better facilitate traffic movement through the one-way couple. Additionally, a small realignment of Bluff Drive is required to provide adequate spacing between the southbound expressway off-ramp and Bluff Drive. Some intersection modifications are required at the existing intersection of Bluff Drive and Route 54 (this is the approximate western limit of the one-way couple).

Four alternatives (three build alternatives) were retained for a more detailed analysis:

- No Action Alternative;
- Alternative A1;
- Alternative A2; and
- Alternative C’.

2.7.1 Alternative A1

This alternative begins at the intersection of Business 54 and Route 54 (Figure 2-2). An interchange is proposed at this location, in which Business 54 and existing Route 54 are connected directly making a through movement as opposed to the current turning movement

configuration. The primary traffic movements are served by grade-separated ramps. Only the eastbound Business 54-to-northbound expressway movement is not grade-separated. This movement is controlled by a traffic signal.

From the interchange at Business 54, the alternative proceeds southerly to a point along Mace Road approximately 1,700 feet west of Route 54 near the Holiday Shores condominium complex and west of Lake Ozark Village. It then continues southerly through Pogue Hollow and intersects existing Route 54 approximately 850 feet west of McDonalds. The one-way couple interchange layout (as described in Section 2.7 is proposed at the southern terminus).

2.7.2 Alternative A2

This alternative also begins at the intersection of Business 54 and Route 54 (Figure 2-3). An interchange is proposed at this location in which Business 54 and existing Route 54 are connected directly making a through movement as opposed to the current turning movement configuration. The primary traffic movements are served by grade-separated ramps. Only the eastbound Business 54-to-northbound expressway movement is not grade-separated. This movement is controlled by traffic signal.

From the interchange at Business 54, the alternative proceeds southerly to a point along Mace Road approximately 750 feet west of Route 54 at the Osage Beach Senior Housing complex and just west of Lake Ozark Village. It then continues southerly through Pogue Hollow and intersects existing Route 54 approximately 850 feet west of McDonalds. The one-way couple interchange layout (as described in Section 2.7) is proposed at the southern terminus.

2.7.3 Alternative C'

This alternative begins approximately 1,900 feet north of the intersection of Business 54 and Route 54 where it veers immediately east of existing Route 54 (Figure 2-6). An interchange is proposed approximately 800 feet east of the Business 54/Route 54 intersection. A series of grade-separated ramps are proposed to handle traffic entering and existing Business 54 and existing Route 54. The movement from eastbound Business 54 to northbound expressway is controlled by a traffic signal.

The alternative proceeds southerly and east of Motel 6 and Staples office supply store when it then veers westerly and crosses existing Route 54 approximately 650 feet south of Mace Road. After crossing Route 54, it passes approximately 850 feet west of Stonecrest Mall and crosses Pogue Hollow in this location. It continues southerly and intersects Route 54 approximately 850 feet west of McDonalds. The one-way couple interchange layout (as described in Section 2.7) is proposed at the southern terminus.

Between the proposed Business 54 interchange and the crossing at Route 54 near the Ozark Opry, a future two-way frontage road is proposed east of the proposed expressway. Since this is considered a future roadway, and because some undeveloped land east of the proposed expressway would be "land locked" by the proposed project, it is necessary to acquire some additional property east of the proposed expressway. At such time that the two-way frontage road is constructed, this additional property can be sold back to interested parties for future development or use.

2.8 Evaluation of Alternatives and Preferred Alternative

The four build alternatives and the No Action alternative were evaluated and screened in an effort to select a preferred alternative. The methodology used to screen the alternatives was the

"list method." To use this method, the study team first had to quantify potential impacts to the natural and human environment resulting from each alternative. Additionally, the study team developed a range of resource criteria to be used as the basis of the evaluation. Each alternative was then evaluated based on each resource criterion and was given a "+," "0," or "-" mark. A "+" mark was given if there were no impacts to the resource in question. A "0," or neutral, mark was given if there was an impact to the resource, but the impact was relatively minor or did not significantly adversely affect the resource. A "-" mark was given if there was a relatively major impact to the resource or if the impact resulted in an adverse affect.

The criteria (along with sub-criteria) used in the evaluation were broken into the following five categories:

1. System Efficiency – Sub-criteria: Length of new improvement, length of secondary improvements, level of service, safety, and complexity of design.
2. Engineering Constructability – Sub-criteria: Terrain, construction impacts, and cost.
3. Avoidance of Critical and Environmental Resources – Sub-criteria: Streams, wetlands, 4(f) properties, archeological sites, historic architecture, threatened and endangered species, and forested land.
4. Social and Economic Resources – Sub-criteria: Residential and business impacts, public land affected, neighborhood disruption, community land use plans, noise, and environmental justice.

Three total build alternatives were under consideration in this EA. Alternative C' is recommended as the preferred alternative (Figure 2-6). This alternative provides improved service to traffic flow, accomplishes the goals of the Purpose and Need, and minimizes impacts to environmental resources.

MoDOT has identified this alternate as the preferred alternate through public involvement and assessment of socioeconomic and environmental consequences. Substantive comments from resource agencies and from the public hearing have been fully evaluated and addressed and the selection of the preferred alternative, C', has been finalized.

A summary of the relative advantages and disadvantages for each alternative is provided in Table 2-1.

A number of public and civic meetings were held that provided the study team with feedback from the community at large. Generally, the public was split in favor of Alternatives A1 and C'. However, some civic leaders from Osage Beach have expressed an interest in Alternative C' as their preferred alternative because it has fewer impacts to residential property and because of its potential to attract new development east of existing Route 54.

The environmental impacts and estimated costs (in 2002 dollars) of the three build alternatives are provided on Table 2-2.

It should be noted that all three build alternatives result in some commercial property impacts. This is largely due to the one-way couple interchange configuration at the southern terminus. As mentioned previously, a one-way couple configuration is required in order to fully address the traffic congestion along Route 54 in this area.

Table 2-1. Advantages and Disadvantages of Each Build Alternative

Build Alternative	Advantages	Disadvantages
A1	• Relatively shortest alternative • No wetland impacts • No impacts to architectural resources • No major utility impacts • Reduces the congestion on Route 54 • Relatively lowest cost • No impacts to Section 4(f) properties	• Relatively greatest impacts to residential property (Holiday Shores, Lake Ozark Village) • Relatively high impacts to forested land • Relatively disruptive construction impacts (Business 54 interchange) • Relatively disruptive visual impact • Relatively higher noise impacts
A2	• No major utility impacts • Reduces the congestion on Route 54 • No wetland impacts	• Relatively greater impact to residential property (Lake Ozark Village, Osage Beach Senior Housing) • Possible Environmental Justice issue (Osage Beach Senior Housing) • Possible Section 4(f) issue (impacts to the Lee Mace property, which contains the Ozark Opry) • Results in a more skewed crossing of the stream in Pogue Hollow • Relatively highest cost • Relatively disruptive construction impacts (Business 54 interchange) • Relatively higher noise impacts
C'	• Reduces the congestion on Route 54 • No impacts to architectural resources • No residential impacts • No impacts to Section 4(f) properties • No wetland impacts • No sensitive noise receptor impacts • Relatively easier construction sequencing at Business 54 interchange	• Relatively longest alternative • Relatively high impacts to forested land • Not the least expensive alternative

Source: MACTEC, 2003.

Table 2-2. Known Potential Environmental Impacts

Criterion/Resource	Alternative A1	Alternative A2	Alternative C'
Length of mainline (mi)	1.83	1.80	2.02
Length of secondary improvements (mi)	1.03	0.91	0.86
Costs (millions)			
Construction	$ 32.104	$ 36.737	$ 36.093
Right of Way	$ 12.496	$ 14.310	$ 10.154
Miscellaneous	$ 11.950	$ 12.897	$ 11.569
Total	$ 56.550	$ 63.944	$ 57.816
Farmland (acres)	0.0	0.0	0.0
Economic Impacts	Yes	Yes	Yes
Displacements			
Residential	5	9	0
Commercial	21	23	14
Parcels Affected			
Residential	8	14	41*
Commercial	53	58	60
Agriculture	2	3	3
MoDOT	4	4	5
Other undeveloped	36	15	7
Right of Way required (acres)	128.83	123.79	188.00†
Environmental Justice	No Impact	Possible Impact (Osage Beach Senior Housing)	No Impact
Air Quality	No Impact	No Impact	No Impact
Noise	Not Significant (proximity to Holiday Shores)	Not Significant (proximity to Osage Beach Senior Housing)	No Impact
Wetlands (# / acres)	0 / 0.00	0 / 0.00	0 / 0.00
Stream Crossings (# /linear feet)	3 / 1,800	3 / 3,025	2 / 2,250
Water Quality	No Impact	No Impact	No Impact
Floodplain (acres)	0.0	0.0	0.0
Forested Area (acres)	100.04	88.23	116.02
Permits Required			
Section 401	Yes	Yes	Yes
Section 404	Yes	Yes	Yes
Floodplain	No	No	No
Wild/Scenic Rivers	No Impact	No Impact	No Impact
Threatened and Endangered Species	No Impact	No Impact	No Impact
Geologic Features			
Caves	None	None	None
Sinkholes	None	None	None
Mines	None	None	None
Public Lands/Parks	No Impact	No Impact	No Impact
Cultural Resources			
Archaeology	None	None	None
Architecture	None	None	None
Bridges	None	None	None
Potential 4(f)s	None	1 (Mace Property)**	None
Public Wells	9	10	6
Hazardous Waste‡	6	4	7
Visual Impacts	Yes	Yes	No
Construction Impacts	Yes	Yes	Yes

* Parcels are undeveloped platted lots in the mobile home park behind Stonecrest Mall.

† This total includes an additional 39.21 acres of right of way on undeveloped land east of the alternative that would become landlocked by the alternative.

** This is a possible impact based on Criterion G of Section 106 of the National Historic Preservation Act.

‡ Known hazardous waste sites.

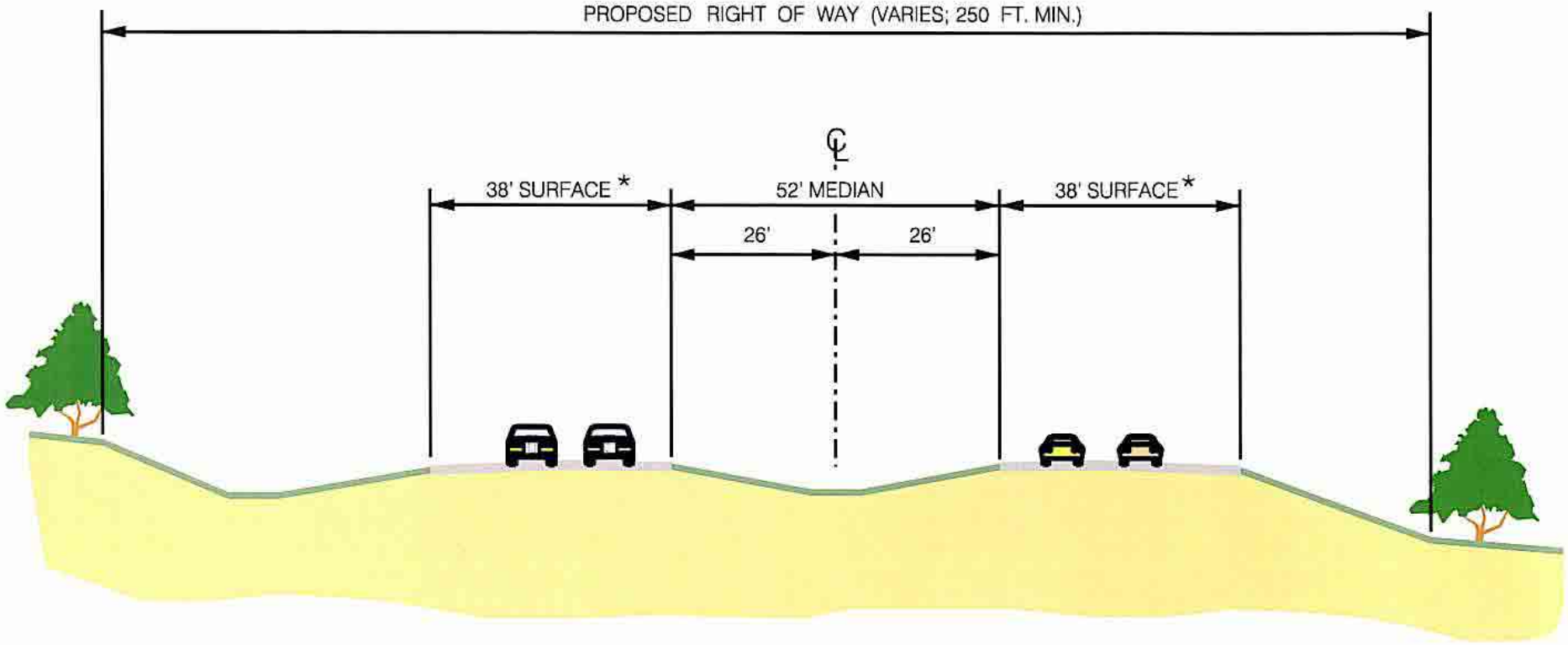
Source: MACTEC, 2003.

2.9 Value Engineering

A value engineering (VE) study was conducted by MoDOT during the week of February 2-6, 2004 in Jefferson City. The VE team used the Caltrans performance rating matrix and developed the following criteria in order of weighting: safety, traffic, access needs, constructability, structural efficiency, property impact, and environmental/cultural impacts. In short, the VE team concurred with the general alignment location and design concept. A summary of recommendations from the VE study follows:

1. Shorten the ramp from westbound Business 54 to the southbound expressway by realigning the ramp slightly to the north (this also could eliminate the need for a tri-level interchange at Business 54.
2. Shorten the bridge carrying existing Route 54 over the new expressway near the Ozark Opry.
3. Realign the expressway bridges to go over Route 54 at the one-way couple interchange.
4. Replace the T-intersection at the Business 54 interchange with a roundabout.
5. Reduce the median width by eliminating the grass median and replacing it with a concrete median barrier.

A complete VE study is available for viewing upon request at MoDOT's Jefferson City district office, 1511 Missouri Boulevard, Jefferson City, Missouri 65102.



TYPICAL SECTION

ROUTE 54 EXPRESSWAY

(MoDOT STANDARD D-61)

* NOTE: SURFACE WIDTH CONSISTS OF 2 – 12 FT. LANES, A 10 FT. OUTSIDE SHOULDER AND A 4 FT. INSIDE SHOULDER.

Figure 2–1

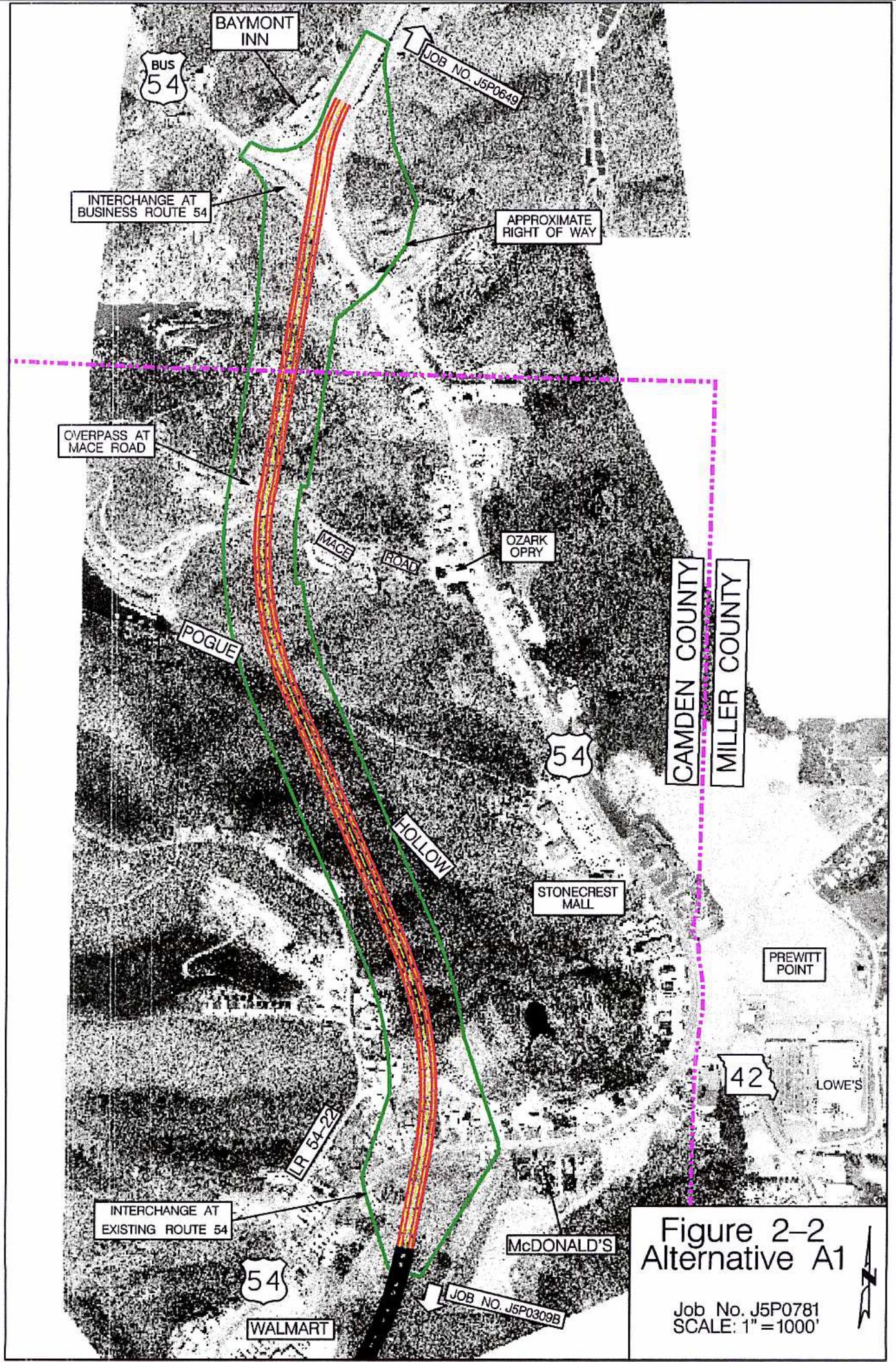


Figure 2–2
Alternative A1

Job No. J5P0781
SCALE: 1" = 1000'

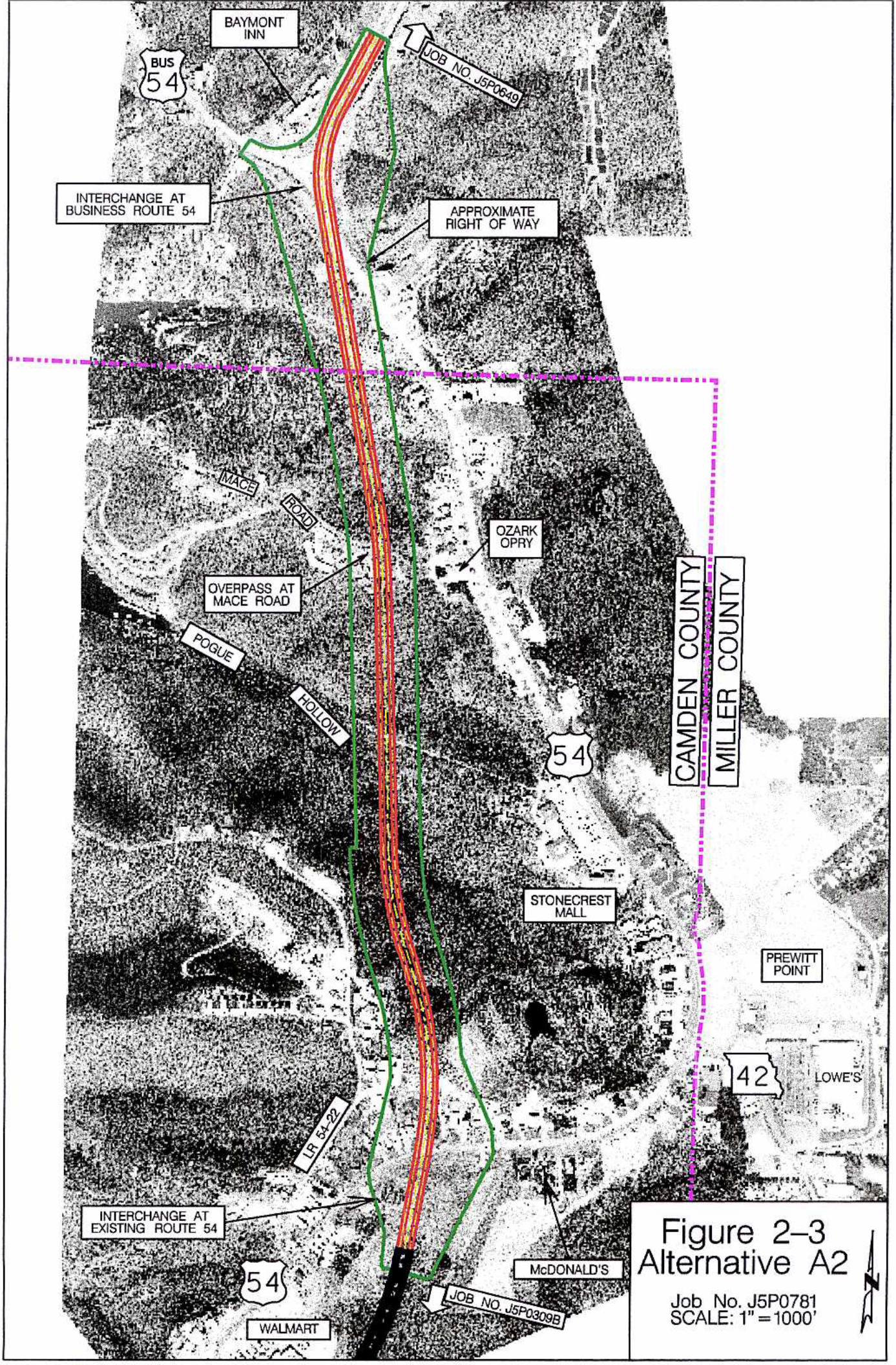


Figure 2–3
Alternative A2

Job No. J5P0781
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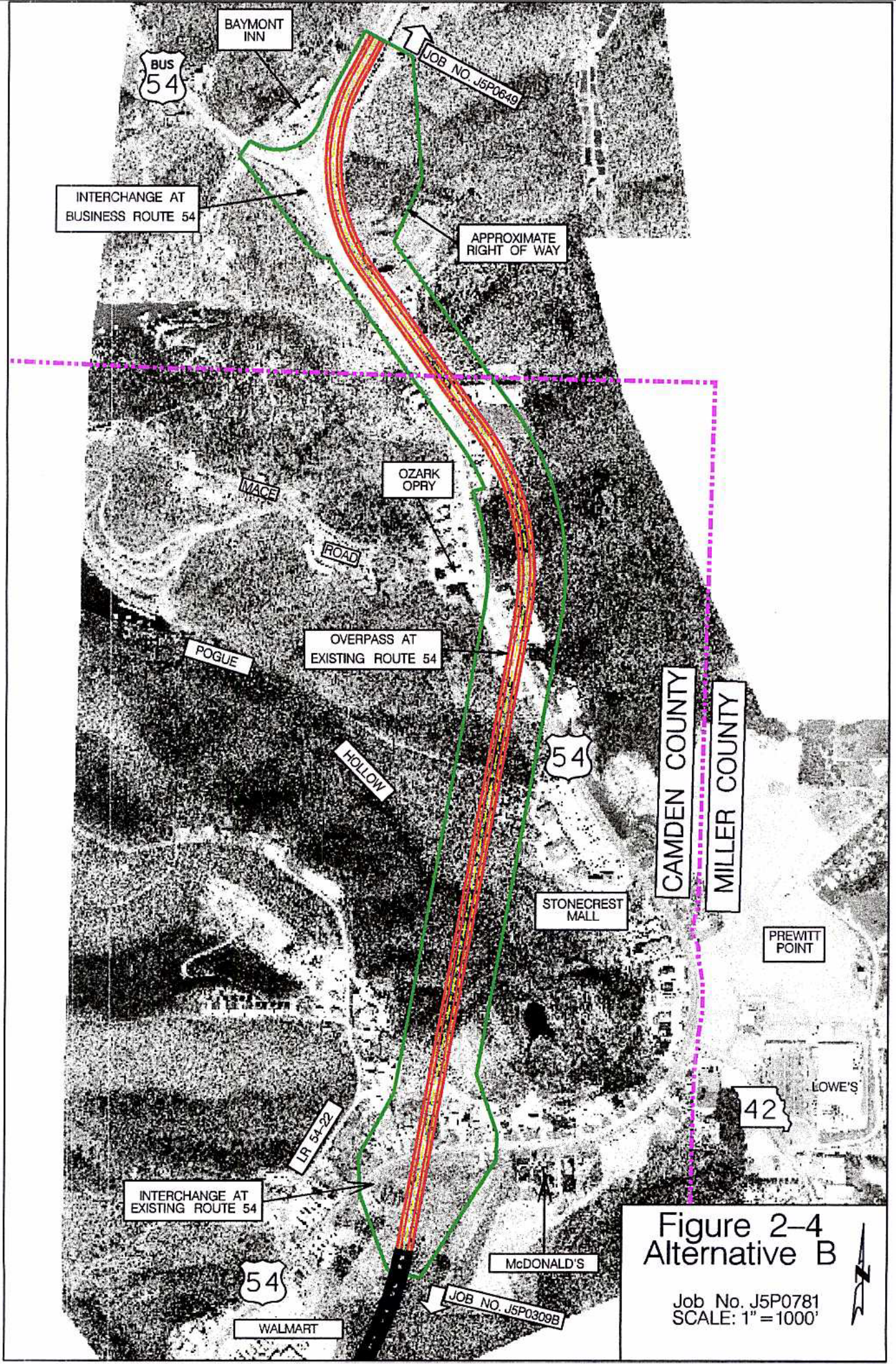

Figure 2–4
Alternative B

Job No. J5P0781
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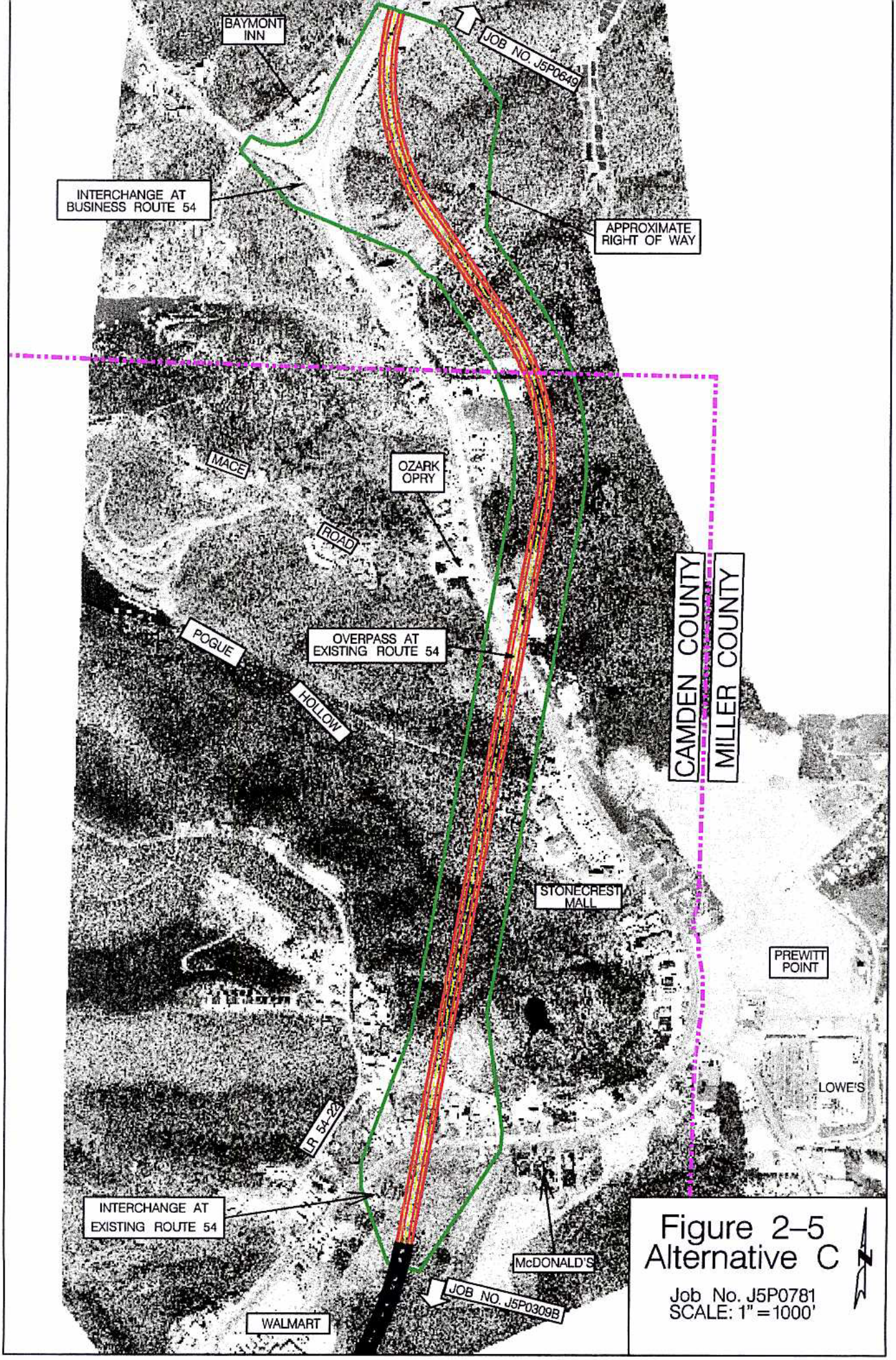

Figure 2–5
Alternative C

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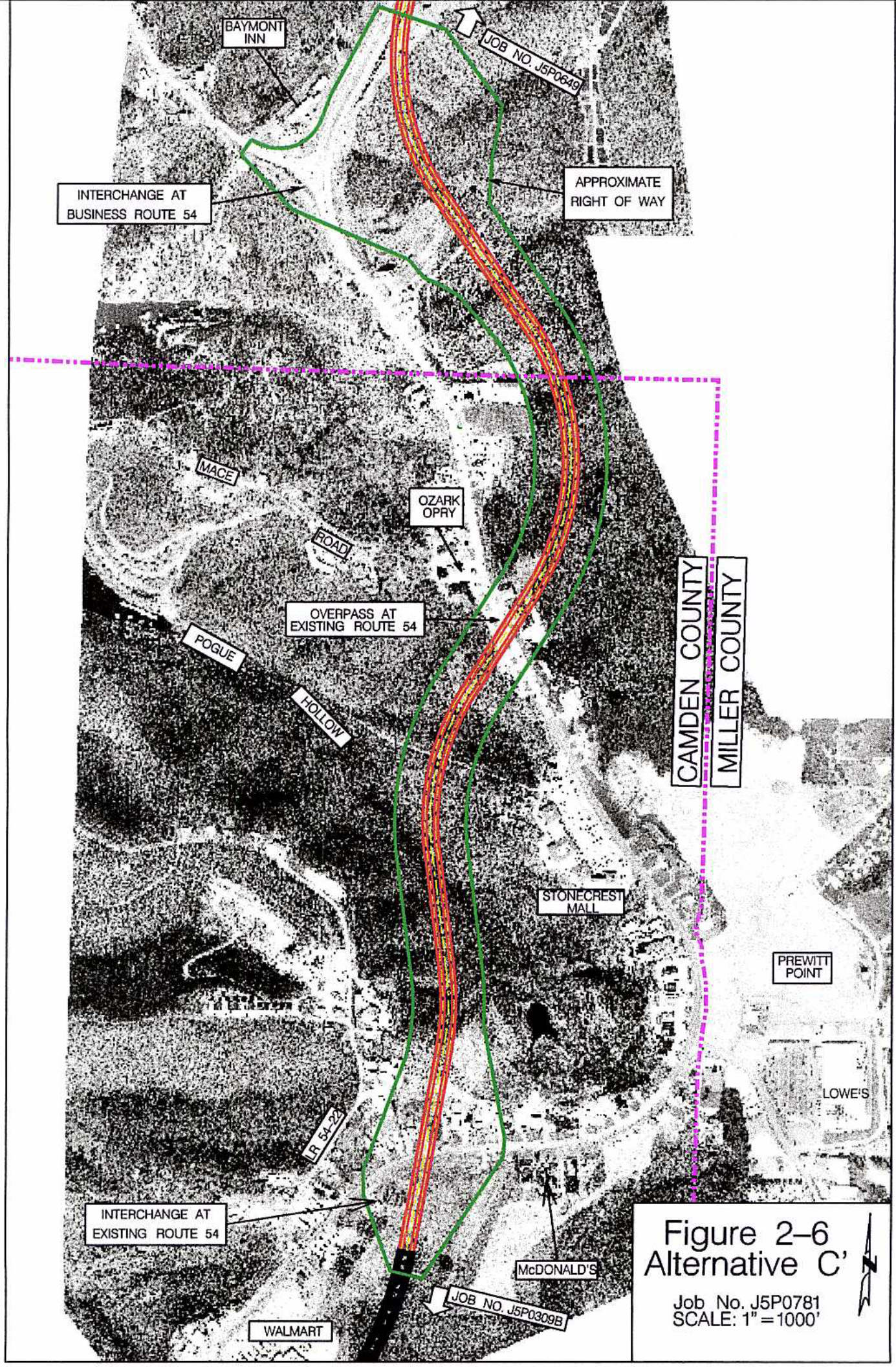

Figure 2–6
Alternative C'

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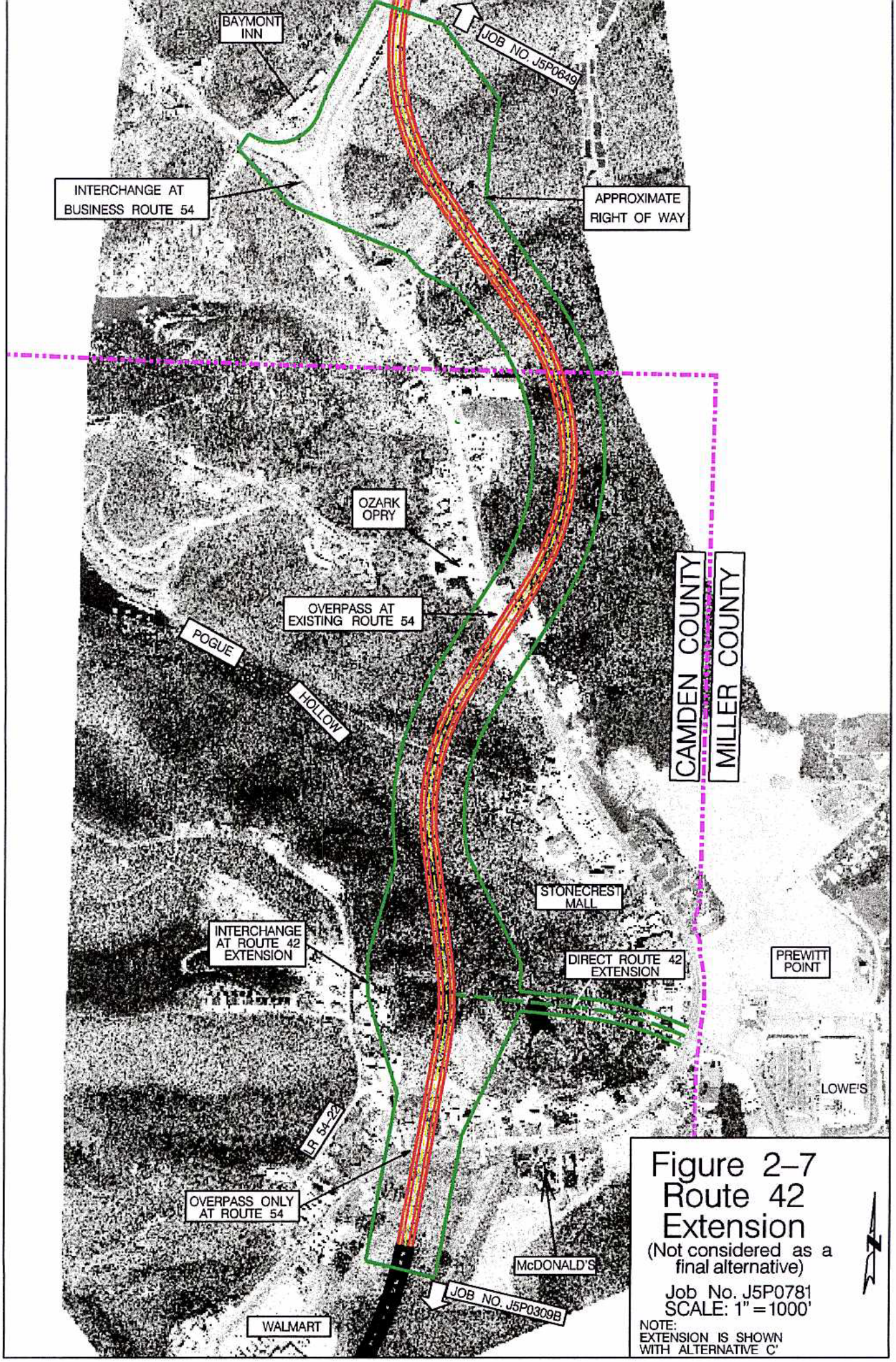

Figure 2–7
Route 42 Extension

(Not considered as a final alternative)

Job No. J5P0781
SCALE: 1" = 1000'

NOTE:
EXTENSION IS SHOWN WITH ALTERNATIVE C'

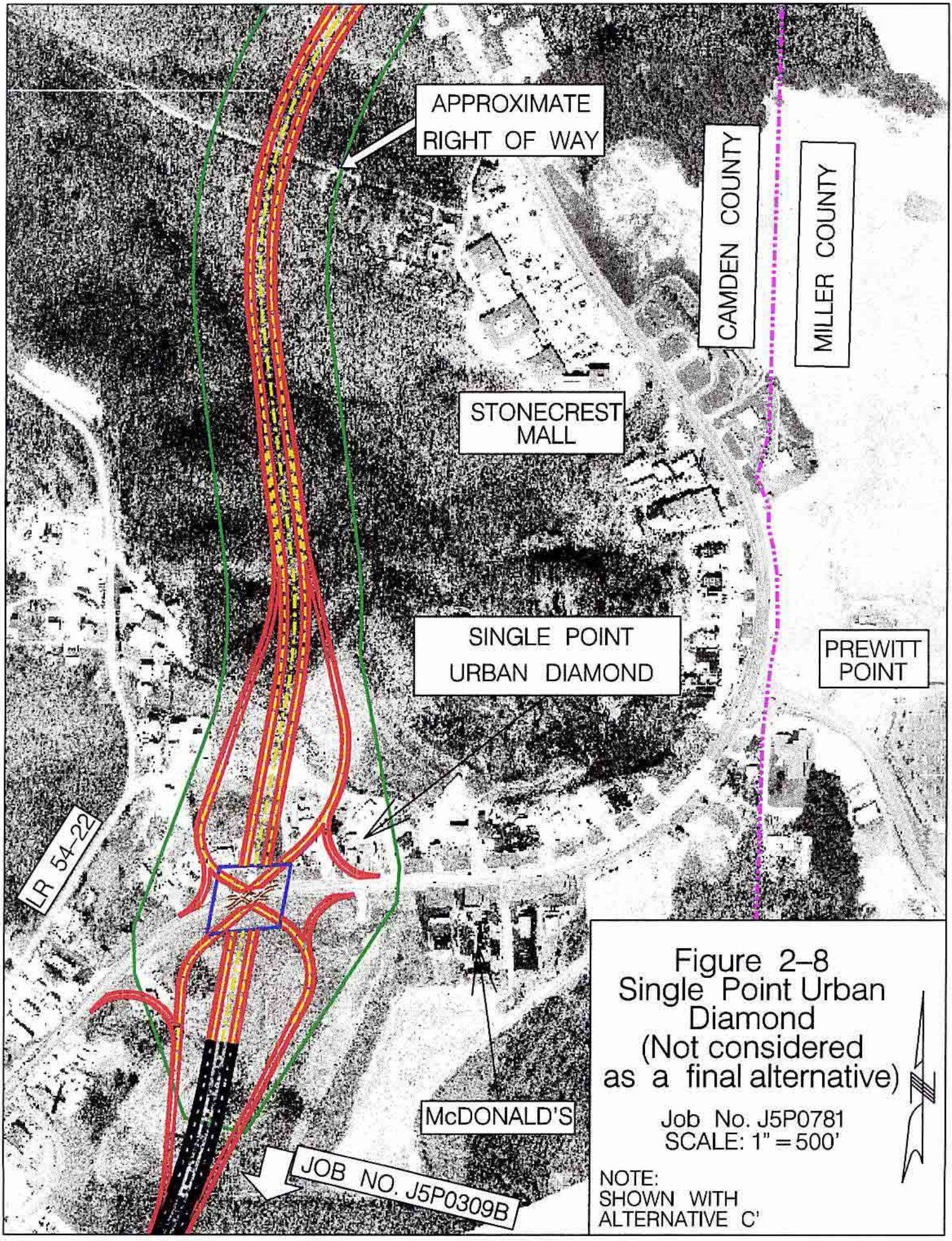

Figure 2–8
Single Point Urban
Diamond
(Not considered
as a final alternative)

Job No. J5P0781
SCALE: 1" = 500'

NOTE:
SHOWN WITH
ALTERNATIVE C'

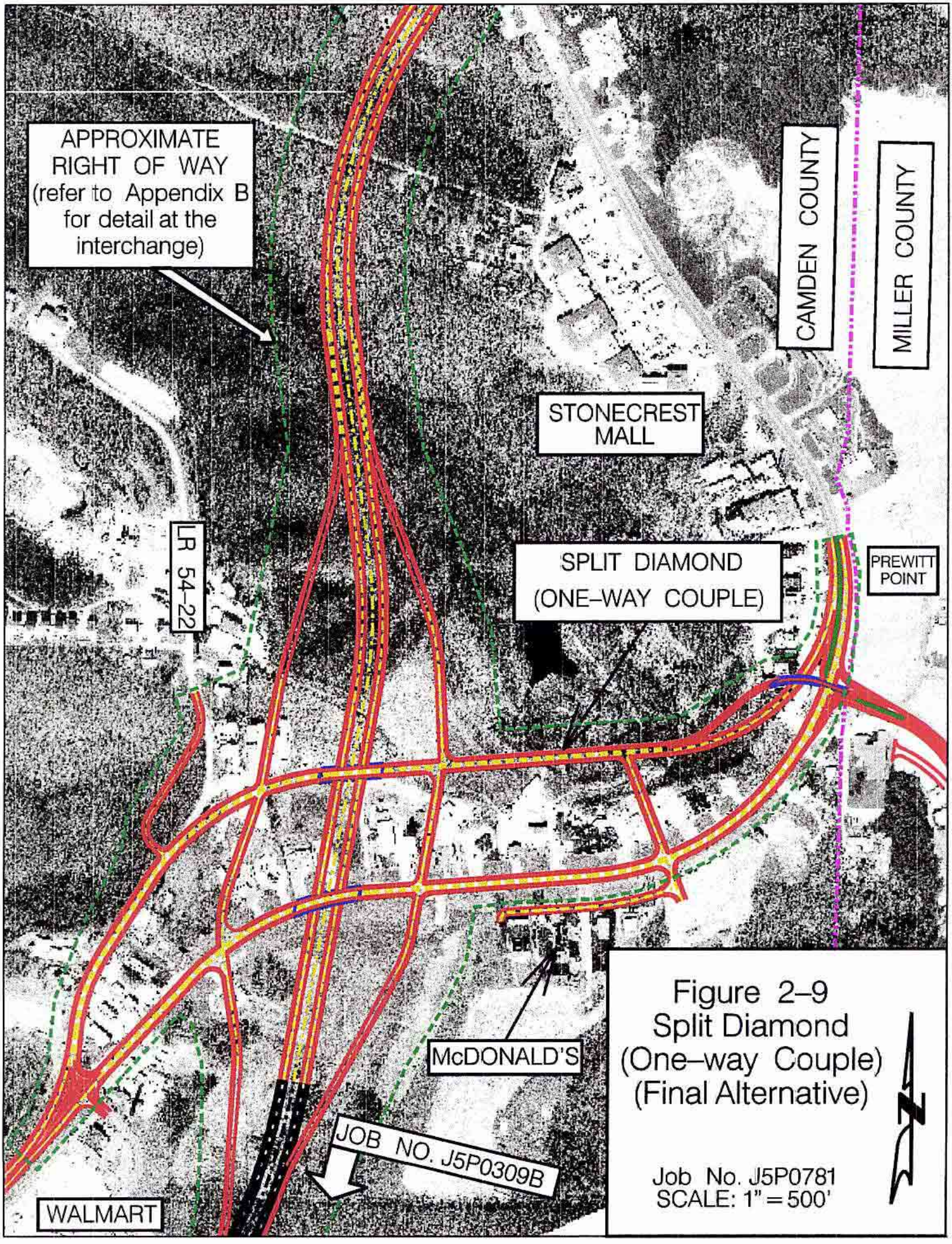

Figure 2–9
Split Diamond
(One–way Couple)
(Final Alternative)

Job No. J5P0781
SCALE: 1" = 500'